MIT RUSSIA

MIT-Russia Global Teaching Labs

2018 Program Report for Renova Charity Foundation

Program Overview

Each year, the MIT-Russia Program matches undergraduate and graduate MIT students from all disciplines with internships and research opportunities in Russia. Within MIT's flagship international program – MIT International Science and Technology Initiatives (MISTI) – we partner with premier companies, universities and organizations to help students acquire pivotal professional experience and generate life-long connections with Russia. Through such academic and professional contacts, we hope to help build bridges between Russia and the U.S.

Thanks to the financial and organizational support of the Renova Charity Foundation for the 2017-18 academic year, MIT-Russia was able to pilot MISTI's high-impact Global Teaching Labs (GTL) program at three schools in Perm, Skolkovo and Yekaterinburg.

Established in 2000, GTL gives MIT students the opportunity to learn through teaching, while sharing MIT's unique approach to education with partner schools around the world. Through GTL, MIT students are matched with school hosts around the world for three weeks in January. At each location, they prepare tailored courses on science, technology, engineering and math (STEM) subjects that complement the school's curriculum and highlight MIT's hands-on educational paradigm.

In January 2018, six MIT students traveled to Russia to work with over 250 high and middle school students on subjects ranging from aerospace engineering, chemistry and biology to computer security and theory of knowledge.

2018 Data

MIT GTL student-instructors by major

- Computer Science and Engineering: 3
- Aeronautics and Astronautics: 1
- Brain and Cognitive Sciences: 1
- Chemistry: 1

MIT GTL student-instructors by class level

- Senior: 1
- Junior: 0
- Sophomore: 4
- Freshman: 1

Host organizations

- School No. 9 in Perm
- International gymnasium of Skolkovo
- Specialized Educational Scientific Center (Sesc) of Ural Federal University in Yekaterinburg

Number of Russian students enrolled in GTL

- Perm: 166
- Skolkovo: 28
- Yekaterinburg: 74
- Total: 268[*]

[*] Based on MIT student-instructors' reported maximum numbers.

GTL Workshops

All MIT-Russia GTL workshops lasted for three weeks in January and either were part of the existing school curricula or were provided as independent extracurricular classes.

Sesc in Yekaterinburg

Karen Camacho (Chemistry '20)

Karen taught Kitchen Chemistry and Other Biochemical Applications, along with a minor introduction to Organic Chemistry. Mainly, this involved teaching students about various chemical and biological processes and how they apply to the process of making and eating certain foods. Karen covered lessons on proteins, oils and fats, carbohydrates, nucleic acids, bread, ice cream, chocolate, meringues, cheese and butter. Through various other topics and experiments, Karen helped students visualize theoretical concepts in chemistry.

Rayden Chia (Computer Science '20)

Rayden taught an introductory course on the Cryptography sub-domain of Computer Security to students studying Mathematics and Informatics. Topics included classical ciphers, modern ciphers, implementation of cryptography in modern systems, and how information was hidden before the age of computers. The course included written and practical exercises, culminating in a final quiz.

School No. 9 in Perm

Piper Sigrest (Aeronautics and Astronautics '18)

Piper shared her passion for airplanes and rockets with five groups of 9th, 10th and 11th grade students. Following MIT's motto "Mens et Manus" ("Mind and Hand"), she focused her lessons on hands-on activities. The students conducted experiments to learn about fundamental concepts in aerospace engineering, such as thermodynamics, forces of flight and Bernoulli's principle. To conclude the lessons, the students built and launched water bottle rockets. Students also practiced teamwork on small teams of two or three students to build their

water bottle rockets.
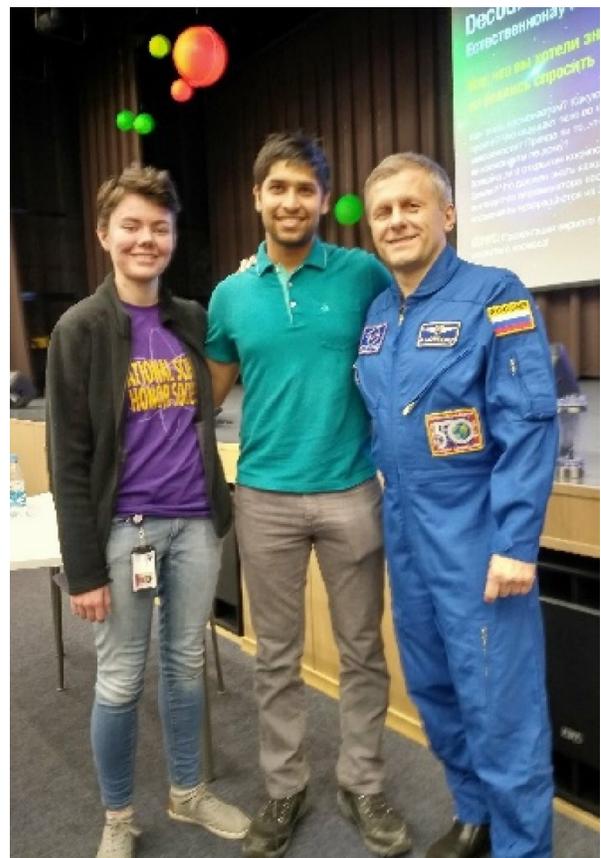
Cole Baker (Computer Science and Engineering '20)

Cole taught the principles of dynamic programming to students in the 10th, 11th and 12th grade. Dynamic programming is a computer science technique for solving problems efficiently by reusing solutions from earlier in the computer program. For instance, Cole developed a game in which the student is a helicopter that is moving to the right with a constant speed. The screen is filled with coins in various positions, and the helicopter must be moved up or down to maximize the coins that are collected. With a game board that is very long and tall, this can seem like an impossible task. The solution is to work from backwards from the end of the game.

International Gymnasium of Skolkovo

Gabrielle Marvez (Brain and Cognitive Sciences '20)

Gabrielle worked with students in IB Biology in the 10th grade, IB Theory of Knowledge in the 10th and 11th grade, and First Aid with the 8th grade students. She prepared presentations for these classes and covered material using Kahoot games, ethics discussions, labs, and educational videos. Gabrielle and her students also did a polymerase chain reaction (PCR) and gel electrophoresis lab in Skolkovo's Technopark with the biology students, which was many of the student's first time in a true laboratory.

Neeraj Prasad (Computer Science and Engineering '21)

Neeraj was asked to teach trigonometry to 10th graders, following their textbook and the IB curriculum, which differed from the traditional workshop-based curriculum of MISTI Global Teaching Labs. Nevertheless, with trigonometry, he was able to teach using a number of online modules and practical exercises that demonstrated the applicability of the subject in the real world.

Selected Post-GTL Testimonials from MIT Students

"I feel that the GTL Russia experience is a must-have for anyone interested in Russian language and culture. It gives a warm, intimate insight into the Russian way of life, all while positively impacting the lives of bright, young students. The hosts also take great care and concern for your well-being, and they make a huge effort to make your experience as engaging as possible."

Rayden Chia
Computer Science '20

"The GTL Russia Program provided me with an experience unlike any other. Being able to teach students about subjects I'm passionate about while simultaneously being given the opportunity to learn about the customs and traditions of a foreign country was incredible."

Karen Camacho
Chemistry '20

"Getting to work abroad for even a brief period of time is an opportunity I hope more students at MIT take advantage of as it opens your mind to other cultures and the possibility of having a career abroad after graduation."

Gabrielle Marvez[*]
Brain and Cognitive Sciences '20

"I could see the impact that I made too – my students were incredibly excited to be taught by MIT students. I provided them an avenue to a different culture, and the insight and possibility to continue their schooling in the US."

Neeraj Prasad
Computer Science and Engineering '21

Selected Post-GTL Testimonials from Host Schools

"The students brought here the outstanding understanding of their subjects and got kids interested. They were definitely a positive asset."

Mansur Sakhbetdinov
Head of Sciences Department at Skolkovo Gymnasium

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[*] Gabrielle Marvez is returning to Russia in summer 2018 to intern at Skoltech through the MIT-Russia internship program.

"Both the students and teachers got the chance to adopt a share learning and teaching practices. The [school] students were introduced to the MIT culture and the perspectives of enrolling at MIT in the future. And cultural exchange always does broaden everyone's horizons."

Anastasia Marilovtseva
Head of Public Relations at Skolkovo Gymnasium

"It was a big challenge for the school but at the same time - the great opportunity for students and teachers for collaboration, communication and exchange. Students from Alexander Pushkin School were so happy to have such interactive and interesting classes with MIT students. Everybody is grateful and does appreciate it."

Mariia Okulova
Deputy Head of School No. 9 in Perm

Links and Further References

Piper Sigrest's blog about her GTL Russia experience in Perm: https://russiagtl.weebly.com/

Piper Sigrest's one-minute video about her GTL Russia experience (submitted to the MISTI video contest): https://www.youtube.com/watch?v=s2BEMSOQ4oY

Photos of Karen Camacho's and Rayden Chia's classes in Yekaterinburg: https://yadi.sk/d/ppTLPEbP3RZzkL

News article about Karen Camacho's and Rayden Chia's classes: https://urfu.ru/ru/news/22339/

News article about Karen Camacho's and Rayden Chia's classes (in progress): https://urfu.ru/ru/news/22282/

Article about Karen Camacho's and Rayden Chia's meeting with the rector of the Ural Federal University: https://urfu.ru/ru/news/22463/

Article about the end of the GTL program in Skolkovo (with quotes from the host school): http://sk.ru/city/gymnasium/b/news/archive/2018/02/09/praktikanty-mit-uspeshno-zavershili-stazhirovku-v-mezhdunarodnoy-gimnazii-skolkovo.aspx